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10/599,102	09/19/2006	Shin Nakamura	W1878.0239	4076

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EXAMINER	
ENIN-OKUT, EDUE	
ART UNIT	PAPER NUMBER
1727	
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/599,102	NAKAMURA ET AL.	
	Examiner	Art Unit	
	Edu E. Enin-Okut	1727	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *05 July 2011*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,7,8,14 and 15* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,7,8,14 and 15* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

SOLID ELECTROLYTE FUEL CELL HAVING AN EVAPORATION INHIBITING LAYER MADE OF A WOVEN OR UNWOVEN FABRIC CONTAINING FIBROUS CELLULOSE

Detailed Action

1. The remarks filed on July 5, 2011 were received. Claims 1, 7, 8, 14 and 15 are pending.

2. The text of those sections of Title 35, U.S.C. code not included in this action can be found in the prior Office Action.

Specification

3. The objection to the title of the invention is withdrawn because applicant has amended the title, as noted above.

Claim Rejections - 35 USC § 103

4. The rejection of claims 1, 7, 14 and 15 under 35 U.S.C. 103(a) as being unpatentable over Ren et al. (US 2004/0209136) in view of Kinkelaar et al. (US 2004/0001991; hereinafter referred to as Kinkelaar '991) and Kinkelaar et al. (US 2004/0001993; hereinafter referred to as Kinkelaar '993) is maintained. The rejection is repeated below for convenience.

Regarding claim 1, Ren teaches a solid electrolyte fuel cell (having a solid membrane electrolyte) (para. 24) comprising:

- layers of a fuel cell ("laminate") compressed to adhesion by bolts (122) (para. 45, lines 17-22; Figs. 1-4 and 8) of
- a methanol delivery film (209, 460, 860) ("limited fuel-permeating part") (para. 48, lines 24-27; para. 31; Figs. 2-4,8),
- an anode current collector (224, 424, 823) (para. 49,67,79; Figs. 2-4,8),

- a catalyzed membrane electrolyte (204, 404, 804) with an electrocatalyst coating on an anode face (206) ("anode catalyst layer"), a membrane electrolyte ("solid electrolyte membrane"), and an electrocatalyst coating on a cathode face (208) ("cathode catalyst layer") (para. 48; Figs. 2-4,8),
- a cathode current collector (226, 426, 836) (para. 49,67,79; Figs. 2-4,8),
- and a cathode filter (290, 480, 880) ("evaporation inhibiting layer") which limits cathode water evaporation rate (para. 59,85)
- in sequence (Figs. 2-4,8),
- wherein the cathode filter (290, 480, 880) ("evaporation inhibiting layer") which covers the surface of the cathode current collector (226, 426, 836) (para. 85-86; Figs. 2-4,8).

Ren teaches the cathode filter ("evaporation inhibiting layer") as an extra cathode backing layer which limits cathode water evaporation rate and curbs evaporative water loss (para. 58,82,85). Ren does not expressly teach that the cathode filter ("evaporation inhibiting layer") is made of woven or unwoven fabric containing fibrous cellulose.

Kinkelaar '991 teaches cathode backing layers/capillarity (32) structure made of woven or nonwoven fibers of cellulose (para. 16) that retains liquids, maintain effective gas diffusion, without adversely impacting fuel cell performance or adding significant expense (para. 11-12,14), these cathode backing layers/capillarity (32) are laminated outside of a foil current collector (36), and the current collector (36) is laminated to the cathode (18) of the PEM (12) (para.107,111; Fig. 1). Kinkelaar '993 teaches that the materials used to form the cathode backing layers/capillarity (32) structure of Kinkelaar '991 can have a void volume ("porosity") that ranges from 65-97% (para. 32,54-59).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to use Kinkelaar '991's cathode back layers/capillarity structure made of woven or

nonwoven fibers of cellulose, where material forming the structure has a porosity from 65-97% as described by Kinkelaar '993, as Ren et al.'s cathode filter ("evaporation inhibiting layer"), because both Kinkelaar '991 and Kinkelaar '993 teaches that it retains liquids, maintain effective gas diffusion, without adversely impacting fuel cell performance or adding significant expense (see Kinkelaar '991, para. 11-12,14; and, Kinkelaar '993, para. 8,32,36), and because Ren teaches the desire for the cathode filter to curb evaporative water loss (see Ren, para. 58, 82,85), thus retaining water. Further, as to the range of the porosity of the evaporation inhibiting layer recited in the claim, it has been held that obviousness exists where the claimed ranges overlap or lie inside ranges disclosed by the prior art (e.g., *In re Wertheim*, 541 F.2d 257, 191 USPQ 90 (CCPA 1976); *In re Woodruff*, 919 F.2d 1575, 16 USPQ2d 1934 (Fed. Cir. 1990)); and, where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation. See MPEP 2144.05 (I), (II).

Ren, Kinkelaar '991 and Kinkelaar '993 do not expressly teach that the evaporation inhibiting layer has a volume expansion coefficient of 4.5 or less and initiating water migration from the evaporation inhibiting layer to the cathode at a temperature of 80°C or lower. However, it is the position of the examiner that such properties are inherent, given that both Ren, as modified by Kinkelaar '991 and Kinkelaar '993, and the present application utilize the same material of woven or nonwoven fibers of cellulose with a similar porosity (see instant application p. 12, lines 20-26; Examples 1 and 2). A reference which is silent about a claimed invention's features is inherently anticipatory if the missing feature is necessarily present in that which is described in the reference. *In re Robertson*, 49 USPQ2d 1949 (1999).

Regarding claim 7, Ren teaches a fuel reservoir (450, 850) ("container") reserving a neat methanol ("liquid fuel") supplied to an anode side is placed adjacently to the methanol delivery

film (209, 460, 860) ("limited fuel-permeating part") (para. 48, lines 22-27; para. 68, lines 1-4; Figs. 2-4,8).

Regarding claims 14 and 15, Ren as modified by Kinkelaar '991 and Kinkelaar '993 teaches that the evaporation inhibiting layer has a thickness from 0.1 to 10 mm (100 to 10,000 μm) (see Kinkelaar '991, para. 115). It has been held that obviousness exists where the claimed ranges overlap or lie inside ranges disclosed by the prior art. *In re Wertheim*, 541 F.2d 257, 191 USPQ 90 (CCPA 1976); *In re Woodruff*, 919 F.2d 1575, 16 USPQ2d 1934 (Fed. Cir. 1990). See MPEP 2144.05 (I).

5. The rejection of claim 8 under 35 U.S.C. 103(a) as being unpatentable over Ren et al. (US 2004/0209136) in view of Kinkelaar et al. (US 2004/0001991; "Kinkelaar '991") and Kinkelaar et al. (US 2004/0001993; "Kinkelaar '993") as applied to claims 1, 7, 14 and 15 above, and further in view of Wilson (US 6,808,838), is maintained. The rejection is repeated below for convenience.

Ren, Kinkelaar '991 and Kinkelaar '993 are applied and incorporated herein for the reasons above.

Regarding claim 8, Ren teaches the fuel reservoir (450, 850) ("container") reserving a neat methanol ("liquid fuel") supplied to an anode side is placed adjacently to the methanol delivery film (209, 460, 860) ("limited fuel-permeating part") (para. 48, lines 22-27; para. 68, lines 1-4; Figs. 2-4,8). Carbon dioxide ("gas generated by a cell reaction") being vented between the anode diffusion layer (210) and the methanol delivery film (209, 460, 860) ("limited fuel-permeating part") by Fig. 2's arrow (234) ("gas discharging part which is not adjacent to the fuel-absorbing member for discharging"), the carbon dioxide ("gas generated by a cell reaction") travels next to the methanol delivery film (209, 460, 860) ("limited fuel-permeating part"). The

methanol delivery film (209, 460, 860) ("limited fuel-permeating part") resists carbon dioxide from flowing back into the fuel chamber, so some of the carbon dioxide flows into ("in the limited fuel-permeating part") the methanol delivery film (209, 460, 860) ("limited fuel-permeating part"), but is kept from going into the fuel chamber, therefore directing the carbon dioxide back out according to Fig. 2's arrow (234) (para. 49, lines 15-18; para. 66; Figs. 2-4,8). A fuel reservoir (450, 850) placed adjacently to the methanol delivery film (209, 460, 860) ("limited fuel-permeating part") (para. 48, lines 22-27; para. 68, lines 1-4; Figs. 2-4,8). Ren desires to have the liquid methanol in the fuel reservoir (450, 850) to undergo a phase change to methanol vapor prior to introduction to anode (para. 68; Figs. 2-4,8).

Ren does not expressly teach a fuel-absorbing member being placed adjacently to a part of the methanol delivery film (209, 460, 860) ("limited fuel-permeating part") that absorbs the liquid fuel.

Wilson teaches a superabsorbent material (36) ("fuel-absorbing member") being placed within a fuel reservoir cavity (34) (6:12-40; Fig. 2B). The superabsorbent material (36) ("fuel-absorbing member") supplies phase changed methanol from neat liquid to vapor form, which limits methanol cross-over (4:57-62).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to add Wilson's superabsorbent material (36) ("fuel-absorbing member") to Ren's fuel reservoir (450, 850), because Wilson teaches that the superabsorbent material (36) ("fuel-absorbing member") supplies phase changed methanol, from neat liquid to vapor form, which limits methanol cross-over (see Wilson, 4:57-62), and desired by Ren (see Ren, para. 68, Figs. 2-4,8).

Response to Arguments

6. Applicant's arguments filed July 5, 2011 have been fully considered but they are not persuasive. In sum, applicant has argued the following in its remarks:

> (a) "There are many benefits that the inventors have discovered with the use of a fibrous cellulose having the volume expansion, water migration and porosity properties defined in claim 1. ..." (p. 5);
>
> (b) "... It is contended ... that such properties [a volume expansion coefficient of 4.5 or less and initiating water migration from the evaporation inhibiting layer to the cathode at a temperature of 80°C or lower, and has a porosity of 70 to 90%] are inherent in the materials disclosed in Ren et al., Kinkelaar '991 and Kinkelaar '993. Applicants respectfully disagree, and submit that a prima facie case of obviousness has not been presented. ... The Office Action ... asserts that the required basis in fact and/or technical reasoning has been presented in that Ren, Kinkelaar '991 and Kinkelaar '993 use the same material (namely cellulose) as Applicants. ... this assertion is not tenable because it necessarily assumes that all cellulose has these properties, and there is no factual basis for that assumption. It is well known that the particular properties of any given material can vary greatly and depend on many factors such as, for example, material density and type and amount of fillers or additives. ..." (p. 5-6);
>
> (c) "... the cited portions of Kinkelaar '993 relate to gas diffusion layers 13 and 13A. These gas diffusion layers are different than the evaporation inhibiting layer defined in independent claim 1. ..." (p. 7).

In response to applicant's arguments, please consider the comments below:

(a) It should be noted that "the discovery of a previously unappreciated property of a prior art composition, or of a scientific explanation for the prior art's functioning, does not render the old composition patentably new to the discoverer." *Atlas Powder Co. v. Ireco Inc.*, 190 F.3d 1342, 1347, 51 USPQ2d 1943, 1947 (Fed. Cir. 1999). Thus the claiming of a new use, new function or unknown property which is inherently present in the prior art does not necessarily make the claim patentable. *In re Best*, 562 F.2d 1252, 1254, 195 USPQ 430, 433 (CCPA 1977). See MPEP 2112 (I).

(b) With respect to applicant's contentions regarding the porosity recited in claim 1, as discussed in the previous Office Action and repeated above, Kinkelaar '993 teaches that the materials used to form the cathode backing layers/capillarity (32) structure of Kinkelaar '991 can

have a void volume ("porosity") that ranges from 65-97% (para. 32,54-59). It has been held that obviousness exists where the claimed ranges overlap or lie inside ranges disclosed by the prior art (e.g., *In re Wertheim*, 541 F.2d 257, 191 USPQ 90 (CCPA 1976); *In re Woodruff*, 919 F.2d 1575, 16 USPQ2d 1934 (Fed. Cir. 1990)); and, where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation. See MPEP 2144.05 (I), (II).

As to the applicant's contentions with respect to the remaining characteristics of the evaporation inhibiting layer recited in claim 1, and the variance of the properties of "any given material" discussed by applicant, it is noted that applicant neither the claims nor describes any additional structural properties of the fibrous cellulose material used in its instant invention, other than it being a woven or unwoven fabric with a porosity of 70 to 90%, which is taught by the combination of the Ren reference and Kinklaar references discussed in the rejections of the previous Office Action and repeated above. Further, applicant has provided no evidence that the materials used to make the evaporation inhibiting layer in the fuel cell taught by the combination of said references will not behave in the manner claimed.

(c) In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

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Conclusion

7. The following prior art made of record and not relied upon in the previous Office Action, Ren et al. (US 2004/0209154), remains pertinent to applicant's disclosure.

8. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to **Edu E. Enin-Okut** whose telephone number is **(571) 270-3075**. The examiner can normally be reached on Monday to Thursday, 7 a.m. - 3 p.m. (EST).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Barbara L. Gilliam can be reached on (571) 272-1330. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you

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/Edu E. Enin-Okut/
Examiner, Art Unit 1727

/Barbara L. Gilliam/
Supervisory Patent Examiner, Art Unit 1727